

Mack A Beacon © (2021) b; open access paper

The following Charts were created by us over a period of time 2010-2020. All taxonomic information herein came from past documents, principally PA Lewis (1974), and Bednarik & McCafferty (1979). Personal rearing of genus and species gave clarification. There are several new species up till the last two (2010) McCafferty *M wudigeum*. Maccaffertium *annae* (2016) Macadam & Ross is in amber with the larva Unknown.

Regarding Maccaffertium *flaveolum* which is questionable we agree with Hagen (1861) that *flaveolum* is a synonym of *interpunctatum* Say (1839) this is why *M flaveolum* does not appear in these charts nor could it, as no larva was known. It does appear in Beacon (2020) Stenacron Larva and adults in the larvae tables as Stenacron *interpunctatum* Say (1839) "syn" page 262 & 263.

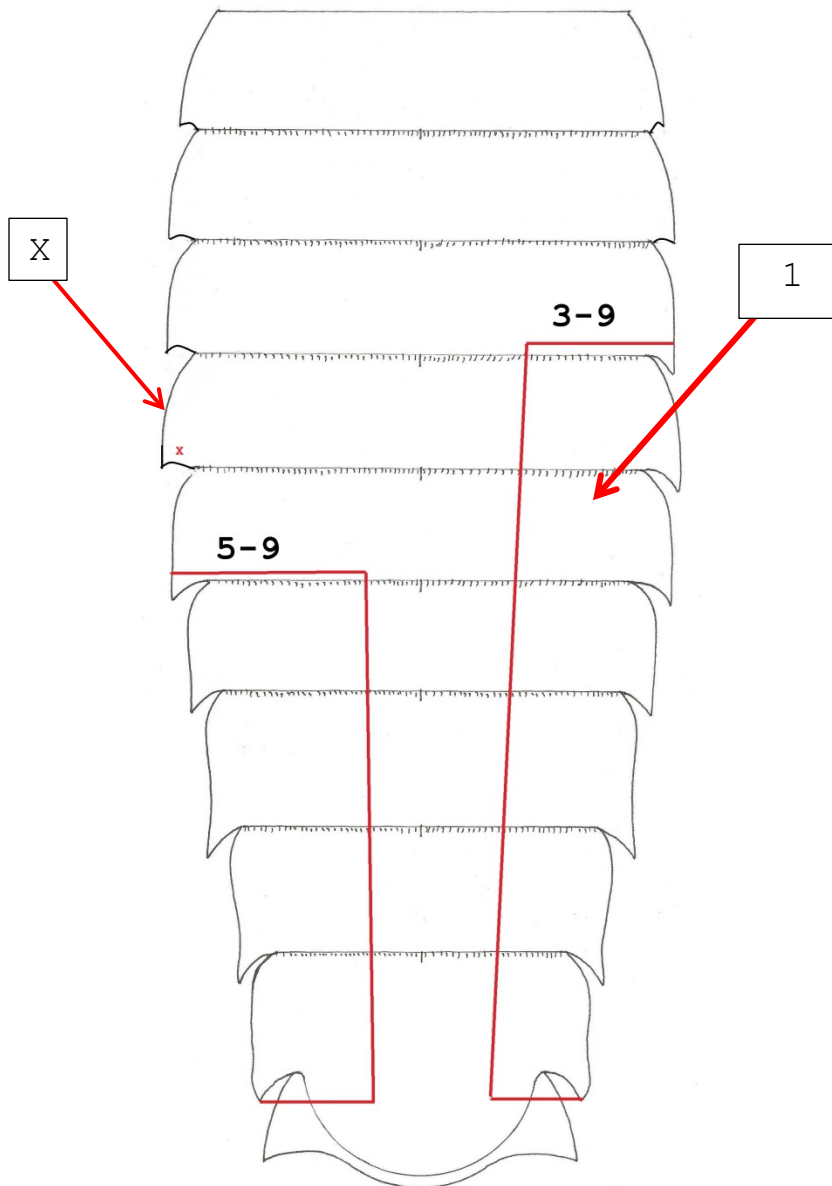
Mouthpart morphology was becoming more common place in the late 1960's and becoming largely advanced with Lewis (1974) The Taxonomy and Ecology of Stenonema Mayflies.

In these charts are diagnostic keys to each larva, but when gray nothing is known about the larvae they were never collected, reared, or they became a synonym before common place mouthpart morphology studies.

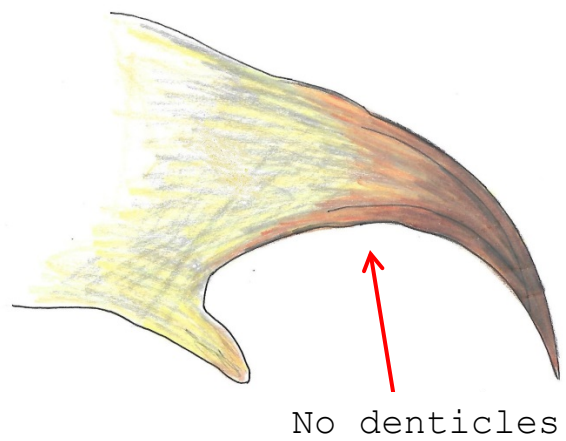
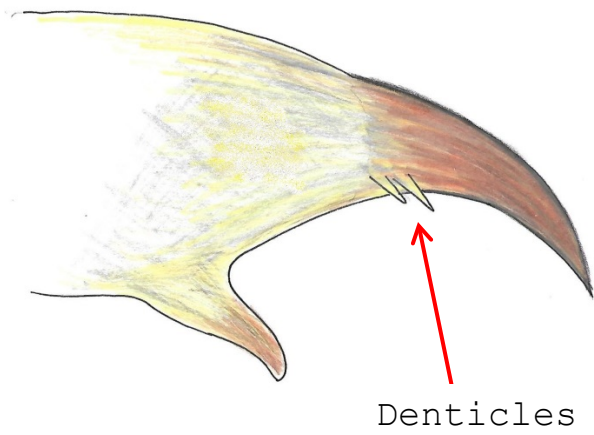
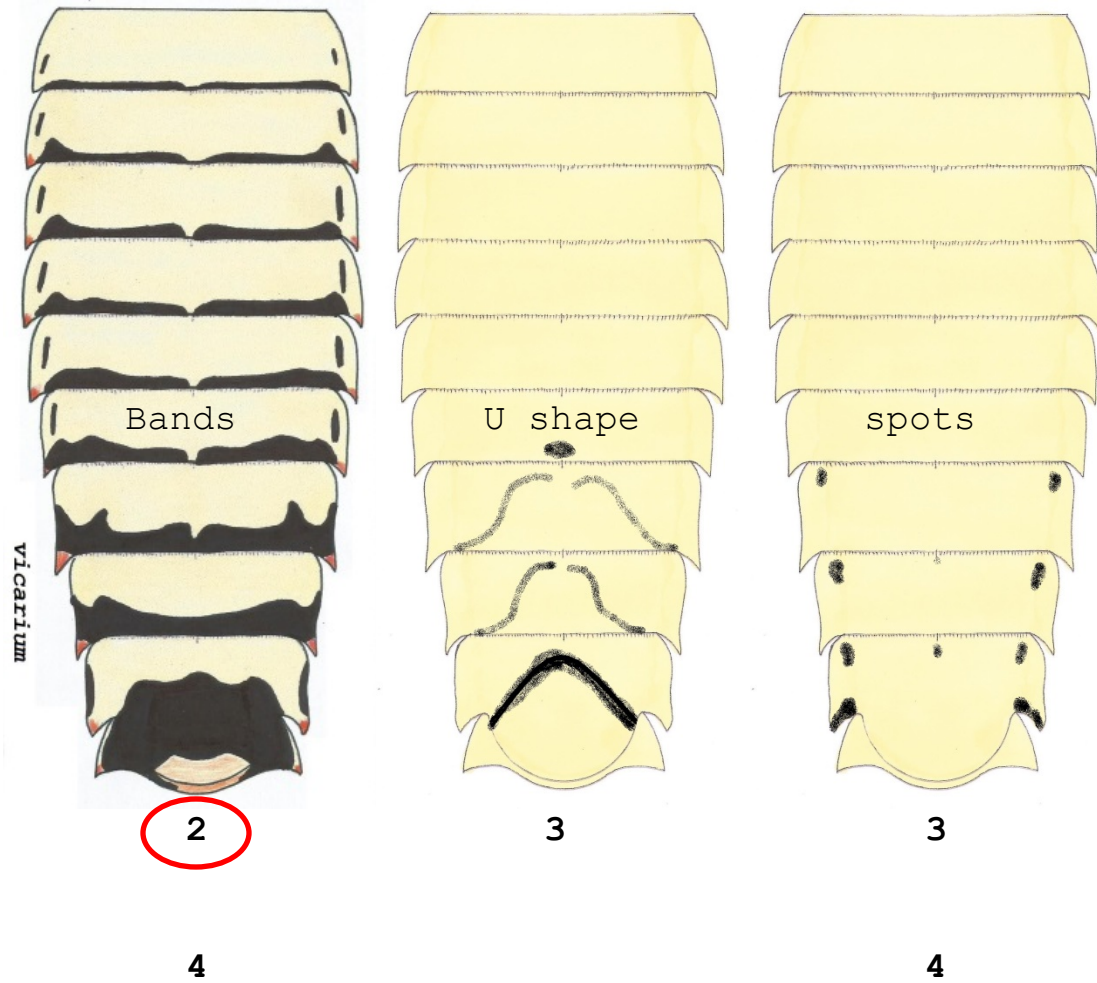
On the charts is Genus, species, synonym/form. Then numbered columns.

- 1: lateral projection on the abdomen of larva.
- 2: ventral black bands found in the *M vicarium* concept.
- 3: ventral markings (EXP) spots, dashes, U shaped.
- 4: denticulate foreclaw (Y) yes or (N) no.
- 5: pectinate setae combs on the crown of the maxilla
- 6: fine setae hairs on the crown of the maxilla
- 7: setae in the submedial row on the maxilla
- 8: teeth on the inner side of the outer canine mandibles

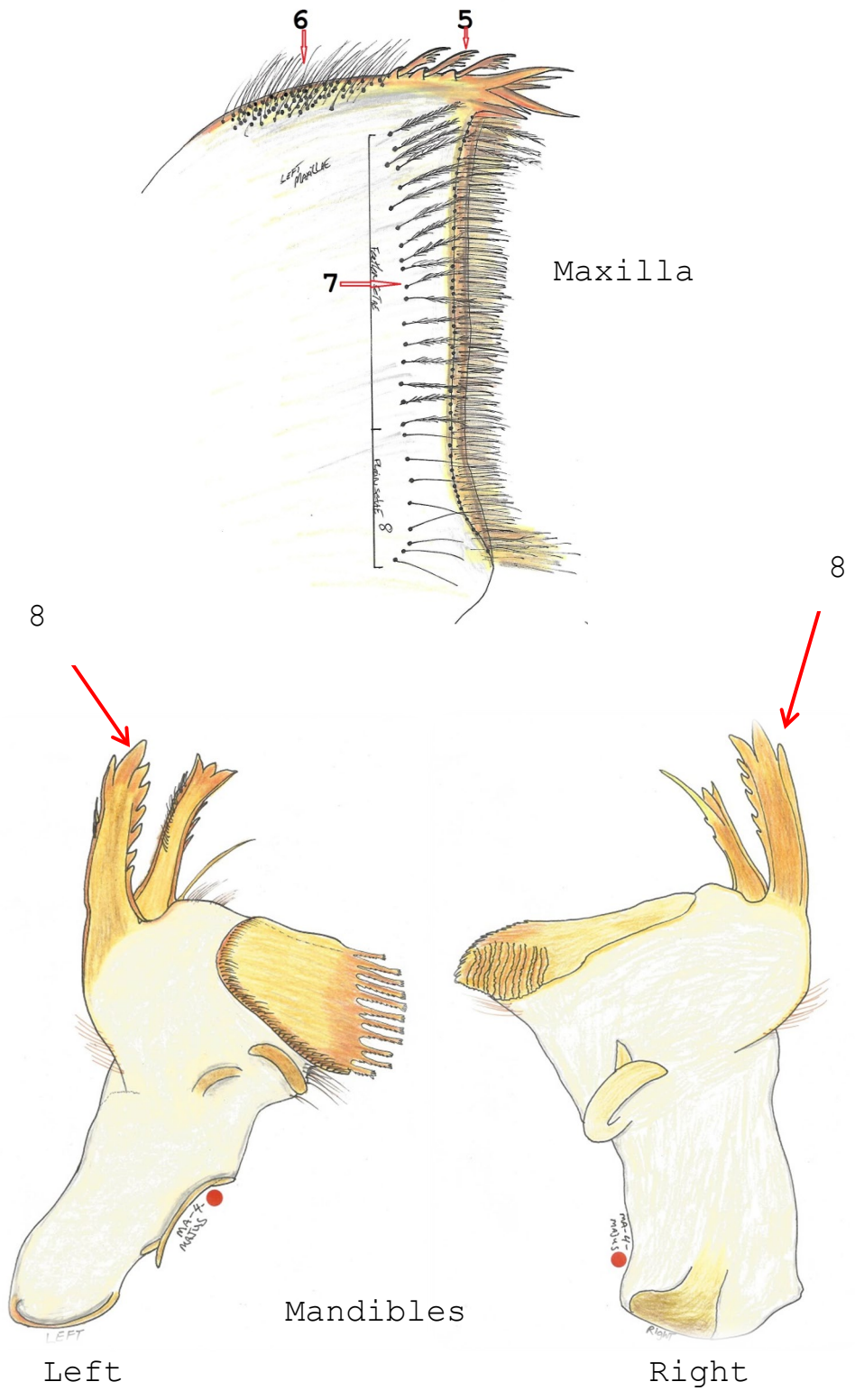
To help clarify the above 1-8 before the charts are inserted illustrations with arrows in numerical sequence to the charts. A clarification is needed regarding lateral projections. Bednarik & McCafferty (1979) page 3 states in order to classify as a projection the apex of the projection must surpass the median posterior margin of the segment, on both dorsal and ventral sides. See red **x** that is not a projection. Gills must be removed for this process.



(Ephemeroptera: heptageniidae)
Maccaffertium & Stenonema Larva diagnostic charts.



(Ephemeroptera: heptageniidae)
Maccaffertium & Stenonema Larva diagnostic charts.



Maccaffertium & Stenonema Larva diagnostic charts.

Maccaffertium larva sortation chart for process of elimination, and dissection

Species concept	form	Syn	1	2	3	4	5	6	7	8
<i>appaloosa</i>	Valid species		3-9↓	N	SPOTS	Y	Ø2	14-18	19-23	7
<i>bednariki</i>	Valid species		7-9	N	SPOTS	N	4-5	0	16-20	5-7
<i>carlsoni</i>	Valid species		3-9	N	YES	N	7-8	0	25-45	8-10
<i>exiguum</i>	Valid species		7-9	N	YES	Y	4-9	0	18-25	6-8
<i>exiguum</i>	<i>Alabamae</i> UNKNOWN		---	--	UNKNOWN	-	----	----	----	----
<i>exiguum</i>	<i>quinquespinum</i>		7-9	N	SLASH'S	N	4-5	0	20-30	7-8
<i>ithaca</i>	Valid species		7-9	N	∩ SHAPE	N	4-6	0	15-26	6-7
<i>ithaca</i>	<i>allegheniense</i>		7-9	N	∩ SHAPE	N	5	20-30	25-35	9-13
<i>Ienati</i>	Valid species		6-9	N	BAND 9	N	1-3	25-30	19-26	8-10
<i>luteum</i>	Valid species		3-9	N	BAND 9	Y	2-4	30-40	18-25	6-7
<i>mediopunctatum</i>	<i>arwini</i>		3-9	N	∩ SHAPE	N	5-6	0-5	18-30	7-8
<i>mediopunctatum</i>	Valid species		3-9	N	∩ SHAPE	N	4-6	1-5	30-40	7-8
<i>mediopunctatum</i>	<i>nepotellum</i>		5-9	N	∩ SHAPE	Y	4-6	0	25-30	7-8
<i>meririvulanum</i>	Valid species		6-9	N	STAIN 9	N	7-9♂	0	30-37♂	9-12
<i>mexicanum</i>	<i>intergrum</i>		7-9	N	LAT 8-9	N	2-3	30-50	15-25	5-8
<i>mexicanum</i>	<i>Bellum</i> UNKNOWN		---	-	-----	-	----	-----	-----	-----
<i>mexicanum</i>	<i>metriotes</i>		---	-	-----	-	----	-----	-----	-----
<i>mexicanum</i>	<i>wabasha</i>		---	-	∩ SHAPE	-	----	-----	-----	-----
<i>mexicanum</i>	Valid species		7-9	N	-----	-	----	-----	-----	-----
<i>modestum</i>	Valid species		7-9	N	∩ SHAPE	Y	4-7	20-40	15-40	6-9
<i>modestum</i>	<i>annexum</i>		7-9	N	∩ SHAPE	Y	4-5	25-30	20-25	6-7
<i>modestum</i>	<i>rubromaculatum</i>		3-9	N	∩ SHAPE	Y	4-7	30-50	20-35	7-9
<i>modestum</i>	<i>rubrum</i>		7-9	N	∩ SHAPE	Y	4-6	15-25	15-25	7-9
<i>modestum</i>	<i>varium</i>		5-9	N	∩ SHAPE	Y	4	10-15	14-18	7+2 in

1; lateral projection, 2; black band across sternum, 3; ventral makings, 4; denticulate fore claws, 5; pectinate setae combs maxilla, 6; fine setae hair on crown of Maxilla, 7; setae submedial row, 8; teeth on inner side of inner canine. Gray areas means unknown larva.

Maccaffertium & Stenonema Larva diagnostic charts.

Maccaffertium larva sortation chart for process of elimination, and dissection

Species concept	form	Syn	1	2	3	4	5	6	7	8
<i>pubicum</i>	Valid species		3-9	N	∩ SHAPE	N	5-8	20-40	30-40	10-11
<i>pulchellum</i>	Valid species		7-9	N	SLASH'S	Y	4-6	0	15-30	6-7
<i>sinclairi</i>	Valid species		3-9	N	SHADE	9	3	30-50	30-40	8-10
<i>smithae</i>	Valid species		7-9	N) LINES	Y	4-6	30-40	20-30	7-8
<i>terminatum</i>	<i>placitum</i>		-----	--	-----	-	-----	-----	-----	-----
<i>terminatum</i>	<i>ares</i>		7-9	N	?	N	3-4	0	15-25	6-7
<i>terminatum</i>	<i>bipunctatum</i>		4?-9	N	SPOTS	Y	3-4	0	20-25	5-6
<i>terminatum</i>	<i>Lepton UNKNOWN</i>		-----	-	-----	-	-----	-----	-----	-----
<i>terminatum</i>	<i>terminatum</i>		7-9	N	SLASH'S	N	4-6	0	13-26	5-7
<i>vicarium</i>	Valid species		3-9	Y	BAND	█	2-4	10-25	15-25	7-8
<i>vicarium</i>	<i>rivulicolum</i>		3-9	Y	SLASH	◆	3	10-25	15-30	6-7
<i>vicarium</i>	<i>fuscum</i>		3-9	Y	SLASH'S	N	2-4	10-40	25-35	7-8
<i>wudigeum</i>	Valid species		3-9 ↓	N	SPOT'S	Y	5	0	18-20	UN
STENONEMA	STENONEMA		STENO	-	STENO	-	STENO	STENO	STENO	STENO
<i>femoratum</i>	Valid species		2-9	N	SPOTS	Y	2	2-16	30-40	5-7
<i>femoratum</i>	<i>scitulum</i>		3-9	N	SPOTS	█	3	10-15	30-35	6-7
<i>femoratum</i>	<i>tripunctatum</i>		3-9	N	SPOTS	█	3-5	10-30	20-40	5-8

1; lateral projection, 2; black band across sternum, 3; ventral makings, 4; denticulate fore claws, 5; pectinate setae combs maxilla, 6; fine setae hair on crown of Maxilla, 7; setae submedial row, 8; teeth on inner side of inner canine. Gray areas means unknown larva. I had extra space so in added in Stenonema to second half of charts.

Acknowledgments; Thank you to the past authors for their hard work that made these charts possible. It was my pleasure to organize this information in one place.

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All *Stenacron* mouthpart counts are inside Beacon M.A. *Stenacron* 2020.